Geomorphic Units on Titan

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The Cassini-Huygens mission has revealed the surface of Titan in unprecedented detail. The Synthetic Aperture Radar (SAR) mode on the Cassini Titan Radar Mapper is able to penetrate clouds and haze to provide high resolution ($\sim$350 m spatial resolution at best) views of the surface geology. The instrument's other modes (altimetry, scatterometry, radiometry) also provide valuable data for interpreting the geology, as do other instruments on Cassini, in particular, the Imaging Science Subsystem (ISS) and the Visual and Infrared Mapping Spectrometer (VIMS). Continuing the initial work described in Lopes et al. (2010, Icarus, 212, 744-750), we have established the major geomorphologic unit classes on Titan using data from flybys Ta through T92 (October 2004-July 2013). We will present the global distribution of the major classes of units and, where there are direct morphological contacts, describe how these classes of units relate to each other in terms of setting and emplacement history. The classes of units are mountainous/hummocky terrains, plains, dunes, labyrinthic terrains and lakes. The oldest classes of units are the mountainous/hummocky and the labyrinthic terrains. The mountainous/hummocky terrains consist of mountain chains and isolated radar-bright terrains. The labyrinthic terrains consist of highly incised dissected plateaux with medium radar backscatter. The plains are younger than both mountainous/hummocky and labyrinthic unit classes. Dunes and lakes are the youngest unit classes on Titan; no contact is observed between the dunes and lakes but it is likely that both processes are still active. We have identified individual features such as craters, channels, and candidate cryovolcanic features. Characterization and comparison of the properties of the unit classes and the individual features with data from radiometry, ISS, and VIMS provides information on their composition and possible provenance. We can use these correlations to also infer global distribution on regions not covered by SAR. This is particularly important as SAR data will not provide complete coverage of Titan by the end of the Cassini mission.